Trend Study 30-55-03

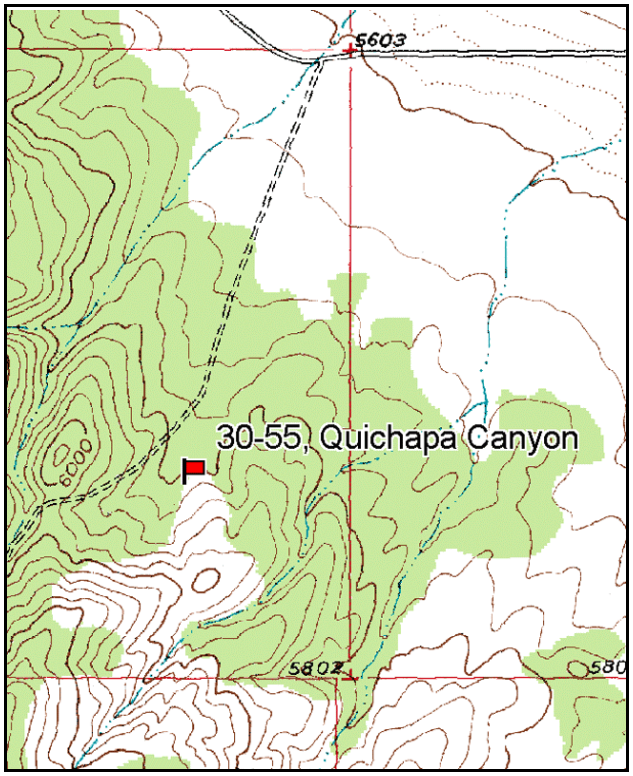
Study site name: Quichapa Canyon Vegetation type: Mountain Brush .

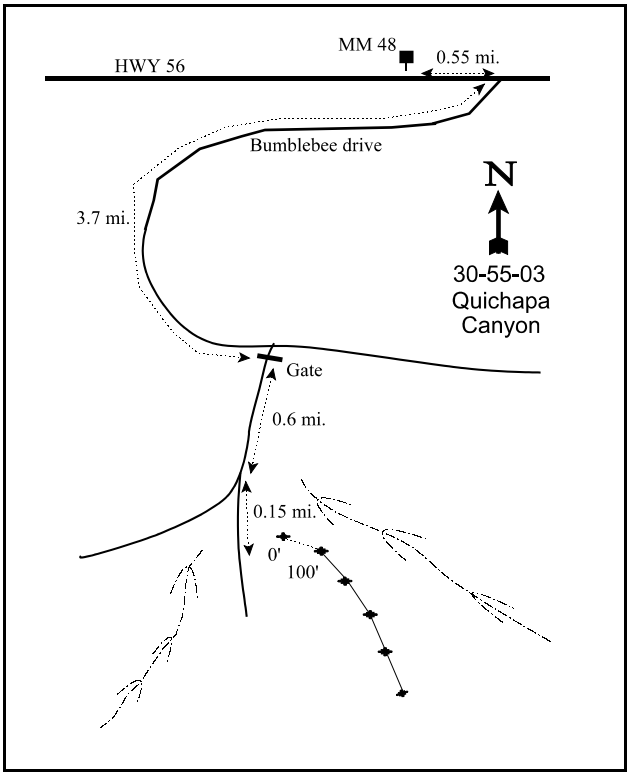
Compass bearing: frequency baseline 103 degrees magnetic. (lines 2-3, 142°M, line 4, 156°M, line 5, 153°M).

Frequency belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft). Rebar: belt 4 on 1ft.

LOCATION DESCRIPTION

From Highway 56, drive to mile marker 48 and continue east 0.55 miles to Bumble Bee Dr., a road on the right (south). Travel 3.7 miles south to a gate on the right. Proceed through the gate and drive 0.6 miles to a fork. Take the left fork for 0.15 miles to the witness post on the left side of the road. The 0-foot stake is 5 paces away at 77 degrees magnetic. The study is marked by half high fenceposts. The 0-foot stake is marked by browse tag # 498.





Map name: Kannarraville Diagrammatic Sketch

Township 37S , Range 12W , Section 7 GPS: NAD 27, UTM 12S 4162671 N, 302367 E

DISCUSSION

Quichapa Canyon - Trend Study No. 30-55

This trend study was established in 1998 to monitor deer winter range on the northeast side of unit 30. The study samples a northwest facing ridge at an elevation of about 5,800 feet with a slope of 20%. The site is a mountain brush type with a juniper overstory. Water is available about 1/4 of a mile to the northeast in a stream. The area receives use by deer, sheep, and some cattle. Pellet group data taken from the site in 1998 estimated 41 deer days use/acre (101 ddu/ha). Several deer were seen near the site during study establishment and fresh pellet groups were also observed. Sheep had also recently used the site in 1998 and a sheep camp was located ½ mile to the northeast. Some cow sign was also observed in low numbers. Pellet group data from 2003 estimated 33 deer days use/acre (83 ddu/ha). Only 1cattle pat was encountered in 2003.

Soil at the site is moderately deep with an effective rooting depth of just over 14 inches. It has a sandy loam texture with clay concentrated in lower horizons. Rock and pavement are common on the surface and within the profile. Soil temperature was high in 2003 averaging 71°F at a depth of just over 11 inches. This high of a soil temperature in late May of 2003 would indicate a dry soil profile. In contrast, average soil temperature was only 55° F at a depth of 14 inches in 1998. Precipitation data from Cedar City shows that annual precipitation was 131% of normal in 1997, and spring precipitation (April to June) in 1998 was 129% of normal. Annual precipitation was only 49% of normal in 2002. Spring periods were well below normal in 2001 at 70% of normal and 2002 at only 19% or normal, while spring precipitation in 2003 was 88% of normal (Utah Climate Summaries 2004). Some erosion appears to be occurring due to poor protective ground cover combined with the steep terrain. The erosion condition class was determined as stable in 2003.

Utah juniper is abundant on the site and slowly increasing. Smaller numbers of pinyon pine are also found. Point-quarter data from 2003 estimated 196 juniper and 32 pinyon trees/acre. Average basal diameter was 4.9 inches for juniper and 2.8 inches for pinyon. These trees provided 37% of the browse cover in 2003 with a line-intercept canopy cover value of 14%. Drought conditions in 2003 caused several trees to have brown leaves. Key understory species consist of Utah serviceberry, mountain big sagebrush, and antelope bitterbrush. Serviceberry provided 26% of the browse cover in 1998 and 30% in 2003. Density was estimated at 1,240 plants/acre in 1998 and 1,780 in 2003. Mature plants average nearly 4 feet in height. They have been moderate to heavily utilized and percent decadence has been moderately high at 44% in 1998 and 34% in 2003. Reproduction has been good.

Mountain big sagebrush provides 30% of the shrub cover with an estimated density of around 2,000 plants/acre. Use of the sagebrush has been mostly light to moderate. Vigor is normal on most plants and percent decadence has increased from 25% in 1998 to 50% in 2003. Bitterbrush occurs in small numbers of about 300 plants/acre. It displays extreme hedging with most individuals sampled being classified as partly unavailable due to hedging. There is no sign of reproduction, although vigor is normal on most plants and percent decadence was only 13% in 1998 increasing to 38% in 2003. There are also small numbers of black sagebrush, true mountain mahogany, and Gambel oak which provide some additional forage.

The herbaceous understory is very poor. Cheatgrass is the most common species as it provided 72% of the grass cover and 66% of the total herbaceous cover in 1998. Drought conditions caused a significant decline in the nested frequency of cheatgrass in 2003 with a corresponding drop in cover from 7% in 1998 to less than 1% in 2003. Bottlebrush squirreltail is the only common perennial grass on the site with several other perennial species occurring less frequently. Forbs are diverse with 19 species encountered in 1998. However, none are very abundant with all of these forbs combining to produce less than 1% cover in 1998 and only 2% cover in 2003. The most abundant species are small annuals.

1998 APPARENT TREND ASSESSMENT

The soil is in poor condition with inadequate protective ground cover and abundant bare soil exposed. Erosion is occurring which further degrades the site potential. This trend will continue unless more herbaceous vegetation becomes established. Trend for browse appears to be going down due to extremely heavy use, poor vigor, high decadence, and poor reproduction for most preferred species. In addition, juniper and to a lesser extent pinyon appear to be increasing which will further reduce the shrub and herbaceous understory. The herbaceous understory is poor with most of the grass cover composed of cheatgrass. Perennial species are present but in small numbers. The forb component is very diverse but depleted.

2003 TREND ASSESSMENT

Trend for soil is stable but in poor condition. Vegetation and litter cover declined slightly while average cover of bare ground declined. The decline in vegetation and litter cover comes from a significant decline in the frequency and cover of cheatgrass. Average cover of rock and pavement increased from 29% in 1998 to 36% in 2003. Some localized erosion is occurring but it is currently minimal. Trend for browse is mixed. Trend for serviceberry is stable. Use remains moderate to heavy but average vigor remained similar and the number of decadent plants declined slightly to 34%. Serviceberry seedlings are fairly abundant and young plants account for 42% of the population. Trend for sagebrush and bitterbrush are down. Density of mountain big sagebrush declined slightly since 1998 but use is heavier, more plants display poor vigor, and one-half the population is now decadent. No seedlings or young were encountered in 2003. Bitterbrush is still being extremely heavily hedged. This is due primarily to its limited numbers (260 plants/acre). Vigor remains normal but the number of decadent plants has increased from 13% to 38%. Due to the high level of use, no flowering was occurring even though annual leader growth was good averaging 2 inches. Taking all of this into consideration, the overall browse trend is considered slightly down. Trend for the herbaceous understory is stable but poor. Sum of nested frequency for perennial grasses remained stable yet nested frequency of cheatgrass declined significantly. Average cover of cheatgrass declined from 7% in 1998 to less than 1% in 2003. Nested frequency of bottlebrush squirreltail also declined significantly as other species increased. Several sites on the unit also show a decline of bottlebrush squirreltail during this drought period. The forb composition remains poor with few perennial forbs found on the site more than occasionally. Annual forbs are more abundant.

TREND ASSESSMENT
soil - stable (3)
browse - down slightly (2)
herbaceous understory - stable but poor (3)

HERBACEOUS TRENDS --
Management unit 30 , Study no: 55

Type	Species	Nested Frequency '98	Nested Frequency '03	Average Cover % '98	Average Cover % '03
G	Bromus tectorum (a)	[b]371	[a]150	7.05	.87
G	Hilaria jamesii	[a]-	[b]14	-	.22
G	Oryzopsis hymenoides	8	11	.21	.10
G	Poa bulbosa	2	-	.00	-
G	Poa fendleriana	31	44	.68	.20

Type	Species	Nested Frequency		Average Cover %	
		'98	'03	'98	'03
G	Poa secunda	3	2	.03	.00
G	Sitanion hystrix	$_{b}$79	$_{a}$51	1.86	.66
G	Vulpia octoflora (a)	4	-	.01	-
Total for Annual Grasses		375	150	7.06	0.87
Total for Perennial Grasses		123	122	2.80	1.20
Total for Grasses		498	272	9.86	2.07
F	Agoseris glauca	6	5	.01	.01
F	Allium spp.	2	-	.00	-
F	Arabis spp.	-	8	-	.07
F	Astragalus convallarius	2	-	.15	-
F	Astragalus spp.	8	2	.02	.00
F	Castilleja chromosa	3	-	.00	-
F	Calochortus nuttallii	4	2	.01	.01
F	Chaenactis douglasii	9	-	.02	-
F	Comandra pallida	-	10	-	.06
F	Collinsia parviflora (a)	$_{a}$61	$_{b}$208	.15	1.25
F	Cymopterus spp.	-	2	.00	.00
F	Descurainia pinnata (a)	$_{a}$3	$_{b}$30	.01	.21
F	Draba spp. (a)	$_{b}$13	$_{a}$1	.03	.00
F	Gilia spp. (a)	$_{a}$-	$_{b}$55	-	.30
F	Lomatium spp.	3	1	.00	.00
F	Microsteris gracilis (a)	$_{a}$73	$_{b}$100	.17	.28
F	Orobanche fasciculata	2	-	.00	-
F	Penstemon spp.	2	-	.00	-
F	Phlox longifolia	19	24	.05	.08
F	Polygonum douglasii (a)	-	5	-	.01
F	Sphaeralcea grossulariaefolia	-	2	-	.00
F	Streptanthus cordatus	-	1	-	.03
F	Stellaria jamesiana	1	-	.03	-
F	Trifolium spp.	18	8	.03	.02
F	Zigadenus paniculatus	3	-	.03	-
Total for Annual Forbs		150	399	0.36	2.08
Total for Perennial Forbs		82	65	0.39	0.31
Total for Forbs		232	464	0.76	2.39

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 30 , Study no: 55

Type	Species	Strip Frequency		Average Cover %	
		'98	'03	'98	'03
B	Amelanchier utahensis	37	34	5.16	4.99
B	Artemisia nova	4	0	2.02	-
B	Artemisia tridentata vaseyana	68	59	3.82	3.53
B	Juniperus osteosperma	8	8	7.06	6.21
B	Opuntia spp.	1	3	-	-
B	Pinus edulis	2	2	.15	.63
B	Purshia tridentata	11	6	1.41	1.31
B	Quercus gambelii	5	5	.03	.06
Total for Browse		136	117	19.68	16.73

CANOPY COVER, LINE INTERCEPT --
Management unit 30 , Study no: 55

Species	Percent Cover	
	'98	'03
Amelanchier utahensis	-	4.26
Artemisia tridentata vaseyana	-	6.44
Juniperus osteosperma	10.19	13.50
Pinus edulis	-	.51
Purshia tridentata	-	.48
Quercus gambelii	1.00	.51

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 30 , Study no: 55

Species	Average leader growth (in)
	'03
Amelanchier utahensis	2.0
Artemisia tridentata vaseyana	1.0

POINT-QUARTER TREE DATA --
Management unit 30 , Study no: 55

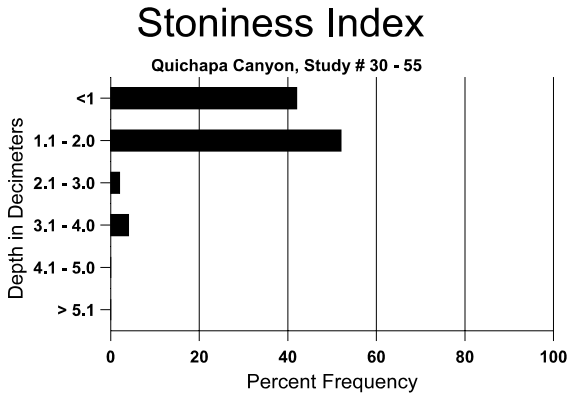
Species	Trees per Acre		Average diameter (in)	
	'98	'03	'98	'03
Juniperus osteosperma	163	196	6.4	4.9
Pinus edulis	23	32	7.2	2.8

BASIC COVER --
Management unit 30 , Study no: 55

Cover Type	Average Cover %	
	'98	'03
Vegetation	30.07	25.30
Rock	11.87	13.54
Pavement	17.17	22.48
Litter	39.04	32.59
Cryptogams	.22	.05
Bare Ground	27.82	20.30

SOIL ANALYSIS DATA --
Management unit 30, Study no: 55, Study Name: Quichapa Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
14.3	71.4 (11.3)	6.5	36.6	38.7	24.7	3.7	14.1	492.8	0.6



PELLET GROUP DATA --
Management unit 30 , Study no: 55

Type	Quadrat Frequency	
	'98	'03
Sheep	2	-
Rabbit	30	19
Deer	35	23

Days use per acre (ha)	
'98	'03
6 (15)	-
-	-
41 (101)	33 (83)

BROWSE CHARACTERISTICS --
Management unit 30 , Study no: 55

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Amelanchier utahensis											
98	**1240**	400	260	440	540	240	27	52	44	26	45/42
03	**1780**	220	740	440	600	300	22	25	34	20	35/34
Artemisia nova											
98	**80**	-	-	-	80	160	0	0	100	75	8/17
03	**0**	-	-	-	-	-	0	0	0	0	-/-
Artemisia tridentata vaseyana											
98	**2100**	80	240	1400	460	480	17	.95	22	6	21/28
03	**1880**	-	-	940	940	920	40	3	50	22	22/26
Cercocarpus montanus											
98	**0**	-	-	-	-	-	0	0	-	0	44/52
03	**0**	-	-	-	-	-	0	0	-	0	-/-
Gutierrezia sarothrae											
98	**0**	-	-	-	-	-	0	0	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	0	8/9
Juniperus osteosperma											
98	**160**	20	100	60	-	-	0	0	-	0	-/-
03	**160**	-	60	100	-	-	0	0	-	0	-/-
Opuntia spp.											
98	**20**	-	-	20	-	-	0	0	-	0	6/12
03	**60**	-	-	60	-	-	0	0	-	0	4/15
Pinus edulis											
98	**60**	20	60	-	-	-	0	0	-	0	-/-
03	**40**	-	40	-	-	-	0	0	-	0	-/-
Purshia tridentata											
98	**300**	-	-	260	40	20	0	93	13	13	20/34
03	**260**	-	-	160	100	100	23	69	38	0	14/29
Quercus gambelii											
98	**160**	20	120	40	-	-	0	13	-	13	31/30
03	**200**	-	160	40	-	-	0	20	-	0	46/37